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**CLEVELAND STATE UNIVERSITY**  
**MINORITY ENGINEERING PROGRAM PIPELINE**

**A Proposal to Increase Minority Student**

**Enrollment and Retention**

**in Engineering**

**FINAL REPORT**

**Principal Investigator: Pamela Charity**

**Grant No. NAG3-1511**

**Grant Period: 1/23/95 to 9/22/95**

**Submitted by:**

**Cleveland State University  
Fenn College of Engineering**

**Pamela Charity, Director  
Undergraduate Affairs  
and Student Relations, ACE Program  
Stilwell Hall Room 104**

**1960 East 24th St. Cleveland OH 44115**

**and Pipeline Associates:**

**Career Services Center  
LINK Program  
Paul B. Klein  
Director**

**Department of Mathematics  
Dr. Bhushan Wadhwa  
Professor**

**November 10, 1995**

## **CLEVELAND STATE UNIVERSITY MINORITY ENGINEERING PROGRAM PIPELINE**

The Cleveland State University Minority Engineering Programs Pipeline consists of programs which foster engineering career awareness, academic enrichment, and professional development for historically underrepresented minority students. The programs involved are the Access to Careers in Engineering (ACE) Program for high school pre-engineering students; the LINK Program for undergraduate students pursuing degrees which include engineering; and the PEP (Pre-calculus Enrichment Program) and EPIC (Enrichment Program in Calculus) mathematics programs for undergraduate academic enrichment. The pipeline is such that high school graduates from the ACE Program who enroll at Cleveland State University in pursuit of engineering degrees are admitted to the LINK Program for undergraduate level support. LINK Program students are among the minority participants who receive mathematics enrichment through the PEP and EPIC Programs for successful completion of their engineering required math courses. These programs are interdependent and share the goal of preparing minority students for engineering careers by enabling them to achieve academically and obtain college degrees and career related experience.

The following are reports from the pipeline programs and information regarding the NASA Scholars from NAG3-1511.

### **Access to Careers in Engineering (ACE) Program**

#### Academic Year

The ACE Program academic year component was scheduled from November 8, 1994 through May 4, 1995. Fifty-one minority high school students from the Greater Cleveland area participated in the Program's afternoon sessions of engineering activities. During the academic year, an engineering discipline is introduced, i.e. civil; electrical; mechanical; industrial; chemical; and technology. Each Thursday afternoon, math and science tutoring is provided for students after their regular school hours.

#### ACE Summer Academic Enrichment Program

The ACE Summer Academic Enrichment was scheduled from June 19 through July 29, 1995. The summer included math courses of algebra I, geometry, algebra II, and English. The courses were instructed by two teachers from Cleveland Heights high school. The summer also included a science/engineering project of creating a martian habitat.

#### ACE Program Highlights:

- A. The ACE Program has successfully completed its fifth year. In June 1995, twenty-three seniors graduated, 100% of them planned to enroll in college beginning Fall, 1995. Eighteen of the twenty-three seniors plan to pursue engineering degrees. Nine of the twenty-three applied to Cleveland State University, and were referred to the LINK Program. See the 1994-95 data below:

### ACE Program Alumni Data

Year	94-95	Percent
#High School Seniors	23	100%
#High School Graduates*	23	100%
#Planning to Enroll in College	23	100%
#Pursuing Engineering	18	78%
# Enrolled at CSU	9	39%

\*These figures are effective as of June, 1995.

- B. The ACE Program won first prize for the 2nd consecutive year of the Lunar Roving robot Competition, sponsored by NASA and the Ohio Space Grant Consortium.
- C. Eight ACE students attended the "Try Math Camp" in Columbus, Ohio from August 10-13, 1995, sponsored by the Honda and the National Society of Black Engineers (NSBE).

### LINK Program

#### Student Recruitment

Approximately 75% of the LINK students were recruited from the Greater Cleveland area for the 1995-96 academic year. During the 1994 recruitment season 39 area high schools in Cuyahoga County were visited and two outside of the County. 141 prospective students were also informed about the LINK Program through college fairs. Additional high school seniors were contacted through the Admissions office inquiry cards. As a result of this recruitment strategy, along with referrals from the ACE Program, the LINK Program was able to meet its enrollment goal.

### Mentoring Activities:

The following mentoring activities were held in 1994:

- \* Mentor Shadowing
- \* Annual LINK Sports Night Out
- \* LINK Mentor/Mentee night at Karamu Theater

### Cooperative Education/Internship Placement:

The LINK students have an opportunity to explore a variety of career fields through Cooperative Education. Many companies, agencies and hospitals select LINK student through the on-campus interviews held each March. In addition, LINK students who receive scholarships from NASA/Lewis Research Center are eligible to apply for NASA Scholar summer internships. Two of them were selected in summer, 1995.

### LINK Program Highlights:

- A. Fourteen LINK students graduated from CSU in June, 1995.
- B. 85% of LINK graduates have been placed in full-time employment in their fields.
- C. Over 70% of the LINK students have been placed in Cooperative Education positions.
- D. Two additional LINK alumni are now mentors.

### **EPIC/PEP**

#### Academic Year:

During 1994-95, thirteen students were supported with their grade point average approximately .7 above the average of all other students in the calculus and pre-calculus courses who did not participate in EPIC and PEP. The majority of EPIC and PEP students are LINK Program students.

#### EPIC/PEP Highlights:

- A. There was such spirit among the students in the EPIC room that funding was raised to print T-shirts. This increased the already high level of camaraderie among the students. This also led to more students being attracted to the room and to help with their math courses, although they were not funded through the grant.
- B. Another spin-off from EPIC and PEP was a group of students who met regularly to study their chemistry together. They took the initiative in persuading a chemistry professor emeritus of African-American descent to join the programs for chemistry assistance.
- C. The achievement and excitement among the students has led to another opportunity. The university has funded the acquisition of two high-level computers to be used in connection with the EPIC room. A lot of things have come together, in large part, due to the existence and use of the NASA grant money.

### **CONTINUED RECIPIENTS OF NASA SCHOLARSHIPS**

The following students from the Minority Engineering Program Pipeline are continued recipients of scholarships from NASA-Lewis Research Center.

Dabney, Lavell  
Jones, Jerodd  
Thomas, Sonja  
Malone, John  
Perea, Raymond  
Deskins, Alonzo

### **Conclusion**

The Cleveland State University Minority Engineering Program Pipeline has benefited greatly from the continued support from NASA-Lewis Research Center. It is with great hope that this partnership between CSU and NASA-Lewis Research Center may be continued in this regard.

# NASA GRANTEE SUBCONTRACTOR

## NEW TECHNOLOGY REPORT

NASA requires each research grantee, research contractor, and research subcontractor to report new technology to the NASA Technology Utilization Office. The required reports and corresponding schedules are as follows:

<u>Title of Report</u>	<u>Form Number</u>	<u>Timetable</u>
Individual Disclosure	NASA 666A	The grantee subcontractor discloses each discovery of new technology individually, at the time of its discovery.
Interim Report	NASA C-3044	For multi-year grant subcontracts, the subcontractor summarizes the previous year's disclosures on an annual basis. The first Interim New Technology (NT) Report is due exactly 12 months from the effective date of the grant.
Final Report	NASA C-3044	The grantee subcontractor submits a cumulative summary of all disclosed discoveries. This Final NT Report is submitted immediately following the grant's technical period of performance.

Subcontractor Name and Address Cleveland State University Fern College of Engineering  
Stilwell Hall 104  
1960 E. 24th St.  
Cleveland OH 44115

Report Submitted by: Pamela C. Charity  
Telephone Number: (216) 687-6912

NASA Grant Title: CSU Minority Engineering Program Pipeline

NASA Grant Number: NAG 3-1511

NASA Project Manager: Pamela C. Charity

Subcontractor Completion Date: 9 / 22 / 95

Today's Date: 11 / 10 / 95

### New technology may be either reportable items or subject inventions.

A reportable item is any invention or discovery, whether or not patentable, that was conceived or first actually reduced to practice during the performance of the grant, contract or subcontract. Large business contractors and subcontractors must disclose reportable items as they are discovered and submit a noncumulative list of these new technology items on an annual basis [ref: Interim NT Report] and a cumulative list at the completion of the grant, contract (or subcontract) period [ref: Final NT Report].

A subject invention is any invention or discovery, which is or may be patentable, that was conceived or first actually reduced to practice during the performance of the contract or subcontract. Grantees, small business contractors and subcontractors must, at a minimum, disclose reportable items as they are discovered and submit a cumulative list of these new technology items on an annual basis [ref: Interim NT Report] and at the completion of the grant, contract (or subcontract) period [ref: Final NT Report].

Grantees, small business contractors and subcontractor are only required to disclose and report patentable items (subject inventions). We request, however, that small business contractors and subcontractors disclose both patentable and nonpatentable (reportable) items, both of which are automatically evaluated for publication as NASA tech briefs and considered for NASA Tech Brief awards.

**PLEASE COMPLETE THE REVERSE SIDE OF THIS FORM AND MAIL TO THE FOLLOWING ADDRESS:**

NASA Lewis Research Center  
Attn: Kathy Kerrigan  
Technology Utilization Office; Mail Stop 7-3  
Cleveland, Ohio 44135

# GOVERNMENT-FURNISHED EQUIPMENT INVENTORY

Grant No.: NAG3-1511

ORS No.: CHY-T4

Principal Investigator: Pamela C. Charity

Grant Expiration: 9/22/95

Status:

## DISPOSITION INSTRUCTIONS:

☐ Return

☐ Transfer to Another Grant

☐ Retain

☒ N/A

Description	Model #	Furnished Date	Equip Cost	*Cond. Code	Location
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N/A

Pamela C. Charity 11/25/95  
(I, the principal investigator, certify that the above information is correct) (Date)

\*Equipment Condition Codes: 4 = Good  
5 = Fair  
6 = Poor

7 = Repairs Req'd (< 15% of Acq Cost)  
8 = Repairs Req'd (16-40% of Acq Cost)  
9 = Repairs Req'd (41-65% of Acq Cost)

X = Salvage (> 65% of Acq Cost)  
S = Scrap (Value is material content only)

CLEVELAND STATE UNIVERSITY  
GRANT EQUIPMENT INVENTORY

UPDATE \_\_\_\_\_

INTERIM \_\_\_\_\_

FINAL X

GRANT NO. NAG3-1511 SUPPL. NO. (If Applicable) N/A ORS NO. CHY-T4

GRANT BEGINNING DATE: 1/23/95

GRANT EXPIRES ON: 9/22/95

PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR: Pamela C. Charity  
(PRINT NAME)

*Pamela C. Charity*  
(SIGNATURE)

11/27/95  
(DATE)

GRANT TITLE: CSU Minority Engineering Program Pipeline

\*\*\*\*\*  
GOVERNMENT-FURNISHED/CONTRACTOR-HELD: INCLUDES "ALL" EQUIPMENT IN THE POSSESSION OF OR DIRECTLY ACQUIRED BY THE GOVERNMENT AND SUBSEQUENTLY DELIVERED TO A GRANTEE

DESCRIPTION	MODEL #	GOVT. REQ. NO.	FURNISHED DATE	EQUIP COST	*COND. CODE	LOCATION
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N/A

DISPOSITION INSTRUCTIONS: N/A RETURN \_\_\_\_\_

RETAIN \_\_\_\_\_

TRANSFER TO GRANT NUMBER \_\_\_\_\_

(USE ADDITIONAL SHEETS IF NECESSARY)

\*EQUIPMENT CONDITION CODES:

4 = GOOD  
5 = FAIR  
6 = POOR

7 = REPAIRS REQ'D (< 15% OF ACQ COST)  
8 = REPAIRS REQ'D (16-40% OF ACQ COST)  
9 = REPAIRS REQ'D (41-65% OF ACQ COST)

X = SALVAGE (> 65% OF ACQ COST)  
S = SCRAP (VALUE IS MATERIAL  
CONTENT ONLY)



CLEVELAND STATE UNIVERSITY  
GRANT EQUIPMENT INVENTORY

UPDATE \_\_\_\_\_

INTERIM \_\_\_\_\_

FINAL X

GRANT NO. NAG3-1511 SUPPL. NO. (If Applicable) N/A ORS NO. CHY-T4

GRANT BEGINNING DATE: 1/23/95

GRANT EXPIRES ON: 9/22/95

PROJECT DIRECTOR/PRINCIPAL INVESTIGATOR: Pamela C. Charity  
(PRINT NAME)

*Pamela C. Charity*  
(SIGNATURE)

11/27/95  
(DATE)

GRANT TITLE: CSU Minority Engineering Program Pipeline

\*\*\*\*\*  
GRANTEE-ACQUIRED EQUIPMENT: EQUIPMENT WHOSE ACQUISITION COST IS \$1,000 OR GREATER THAT WAS PURCHASED OR FABRICATED WITH GRANT FUNDS BY A GRANTEE

DESCRIPTION	MODEL #	CSU REQ. NO.	ACQ. DATE	EQUIP COST	*COND. CODE	TAG NO.	LOCATION
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N/A

THE PRINCIPAL INVESTIGATOR WISHES TO RETAIN POSSESSION OF THIS EQUIPMENT UPON EXPIRATION OF THE GRANT: N/A YES \_\_\_\_\_ NO \_\_\_\_\_

(USE ADDITIONAL SHEETS IF NECESSARY)

\*EQUIPMENT CONDITION CODES:

4 = GOOD  
5 = FAIR  
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7 = REPAIRS REQ'D (< 15% OF ACQ COST)  
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9 = REPAIRS REQ'D (41-65% OF ACQ COST)

X = SALVAGE (> 65% OF ACQ COST)  
S = SCRAP (VALUE IS MATERIAL  
CONTENT ONLY)

**NEW TECHNOLOGY REPORT**

NT CONTROL NO.(OFFICIAL USE ONLY)

This form may be used when reporting inventions, discoveries, improvements or innovations to NASA. Use of this report form is optional; provided, however, that whatever report format is used contain the essential information requested herein.

In completing each section, use whatever detail deemed appropriate for a "full and complete disclosure," as required by the following clauses: New Technology, Patent Rights - Retention by the Contractor, and Patent Rights - Retention by the Grantee.

Additional documentation which provides a full, detailed description should be attached, as well as any explanatory sheets where necessary.

1. TITLE      Cleveland State University Minority Engineering Program Pipeline:  
A Proposal to Increase Minority Student Enrollment and Retention in Engineering

2. INNOVATOR'S NAME, SOCIAL SECURITY NO.\*, HOME ADDRESS

Pamela C. Charity

5305 Northfield Rd. #407  
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3. EMPLOYER (Organization and Division)

Cleveland State University

4. ADDRESS (Place of performance)

Cleveland State University  
Fenn College of Engineering  
Stilwell Hall Rm. 104

1960 E. 24th St.  
Cleveland OH 44115

5. NASA PRIME CONTRACT NO.

N/A

6. CONTRACTOR DISCLOSURE NO.

N/A

SECTION I - DESCRIPTION OF THE PROBLEM THAT MOTIVATED THE TECHNOLOGY DEVELOPMENT. (Enter A-General Description of Problem Objective; B-Key or Unique Problem Characteristics; C-Past History/Prior Techniques; D-Limitations of Prior Techniques)

N/A

SECTION III - UNIQUE OR NOVEL FEATURES OF THE TECHNOLOGY AND THE RESULTS (OR BENEFITS) OF ITS APPLICATION  
(Enter as appropriate A-Novel or unique features; B-Development or conceptual problems; C-Operating characteristics, test data;  
D-Analysis of capabilities; E-Source of error; and F-Advantages/shortcomings)

N/A

SECTION IV - SPECULATION REGARDING USEFUL NON-AEROSPACE APPLICATIONS OF THE INNOVATION OR TECHNOLOGY

N/A